| Question Paper Code | 12811 |

## B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

Second Semester

### Electronics and Instrumentation Engineering

(Common to Instrumentation and Control Engineering)

### 20BSPH206 - PHYSICS FOR INSTRUMENTATION ENGINEERING

Regulations - 2020

Duration: 3 Hours　　　　　　　　　　　　　　　　Max. Marks: 100

### PART - A (10 × 2 = 20 Marks)
Answer ALL Questions

| | | Marks | K–Level | CO |
|---|---|---|---|---|
| 1. | What is Fermi energy level? Give its significance? | 2 | K2 | CO1 |
| 2. | Define drift velocity and mobility. | 2 | K1 | CO1 |
| 3. | How p type semiconductors are formed? | 2 | K2 | CO2 |
| 4. | Given an extrinsic semiconductor, how will you find whether it is n-type or p-type? | 2 | K2 | CO2 |
| 5. | Define the term persistent current. | 2 | K1 | CO3 |
| 6. | What is Josephson Effect? | 2 | K1 | CO3 |
| 7. | Define magnetic permeability. | 2 | K1 | CO4 |
| 8. | What happens to the magnetic flux when a diamagnetic material is kept in a magnetic field? | 2 | K1 | CO4 |
| 9. | What do you mean electric dipole and dipole moment? | 2 | K1 | CO5 |
| 10. | Compare active and passive dielectrics. | 2 | K2 | CO5 |

### PART - B (5 × 13 = 65 Marks)
Answer ALL Questions

11. a) Derive an expression for the density of states and based on that calculate the carrier concentration in metals.　　13　K2　CO1

**OR**

b) Derive an expression for the effective mass of an electron moving energy bands of a solid.　　13　K2　CO1

12. a) Derive an expression for the carrier concentration of an intrinsic semiconductor.　　13　K2　CO2

**OR**

b) Derive an expression for the Hall coefficient for an n-type semiconductor. Also, deduce the Hall voltage in terms of Hall coefficient.　　13　K2　CO2

*K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create*　　　***12811***

13. a) Explain in detail the various properties of superconductors.     *13   K2   CO3*

**OR**

b) Write a short note on high temperature -123 superconductors. Also *13   K2   CO3* discuss about their characteristics, preparation method and crystal structure.

14. a) Describe ferromagnetic domain theory. Also, explain the different *13   K2   CO4* types of energy involved in domain growth.

**OR**

b) What are ferrites? Explain its structure, properties and applications.     *13   K2   CO4*

15. a) Obtain an expression for internal field expression using Lorentz *13   K2   CO5* method and hence deduce the Clausius –Mosotti Equation.

**OR**

b) Discuss the different types of polarization mechanisms and *13   K2   CO5* polarizability involved in dielectric materials

### PART - C (1 × 15 = 15 Marks)

16. a) What are metallic glasses? Describe the preparation, properties and *15   K2   CO6* applications of metallic glasses.

**OR**

b) Explain the theory and working of LCD. Also mention its advantages, *15   K2   CO6* disadvantages and applications.

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